F. North Central Coast Air Basin (Monterey Bay Unified APCD)

The North Central Coast Air Basin is comprised of a single air district, the Monterey Bay Unified APCD, and consists of Santa Cruz, San Benito, and Monterey Counties. The entire air basin currently violates both the State 24-hour and the annual average PM10 standards. However, the air basin is designated as attainment for the State PM2.5 annual average standard.

Figure F-1 shows the location of PM10 (a) and PM2.5 (b) monitoring sites throughout the North Central Coast Air Basin.

Figure F-1. PM10 and PM2.5 Monitoring Sites throughout the Air Basin.

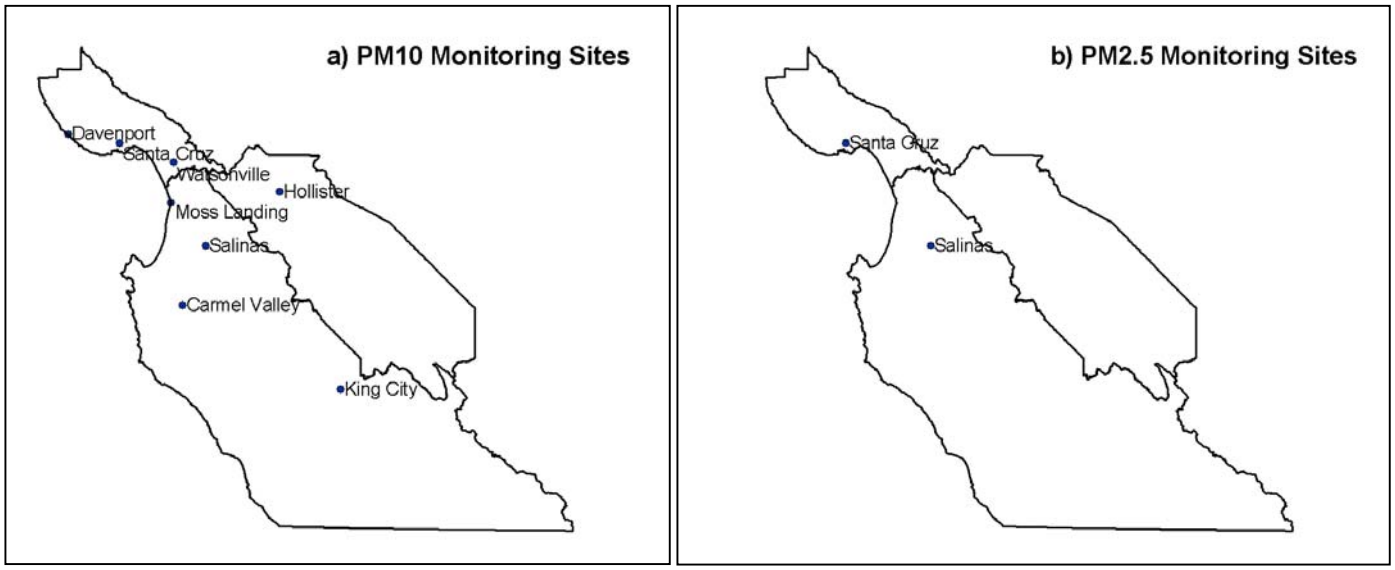


Table F-1 provides information on yearly variations in the highest PM10 and PM2.5 concentrations recorded across the Monterey Bay Unified APCD in 2001 through 2003. We estimate that during this period, particulate levels exceeded the State 24-hour PM10 standard of 50 $\mu g/m^3$ sixty-six times. PM10 levels also exceeded the State standard of 20 $\mu g/m^3$. However, PM2.5 concentrations did not exceed the State annual standard of 12 $\mu g/m^3$.

Table F-1. PM10 and PM2.5 Air Quality in the Monterey Bay Unified APCD.

Year	PM10 (ug/m^3)			PM2.5 (ug/m^3)	
	Calculated Days over State Std.	Max 24-hour (Std.=50)	Max Annual Average (Std.=20)	Max 24-hour*	Max Annual Average (Std.=12)
2001	Incomplete Data	74	Incomplete Data	26	9
2002	25	81	29	24	9
2003	41	90	32	16	7

* The maximum 24-hour PM2.5 values are provided for information only.

Table F-2 provides the 24-hour and annual designation values for the State standards for the 2001-2003 period. Designation values represent the highest 24-hour PM10 concentration measured during the three year period, after concentrations measured during highly irregular and infrequent events have been excluded, and the highest estimated PM10 and PM2.5 annual average in the same period. The designation values are determined for each site, and the highest site is used for determining an area's designation. Based on these data, the Monterey Bay Unified APCD currently is nonattainment for both the State 24-hour and annual average PM10 standards. The District is designated as attainment for the State annual PM2.5 standard.

Table F-2. Air District Level Designation Values* for the State PM10 and PM2.5 Standards (2001-2003 Period).

	PM10 (ug/m^3)		PM2.5 (ug/m^3)
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Designation Value	90	32	9

* Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

Table F-3 provides designation values for each monitoring site in the air district to provide further information on the geographic distribution of concentrations. Highest PM10 concentrations were observed at the Moss Landing site. Overall, particulate levels exceeded the State PM10 24-hour standard at four of the seven monitors in the air district (Moss Landing, Salinas, Hollister, and Davenport) and the PM10 annual standard at two coastal sites (Moss Landing and Davenport). PM2.5 annual average concentrations were well below the State standard of 12 $\mu g/m^3$.

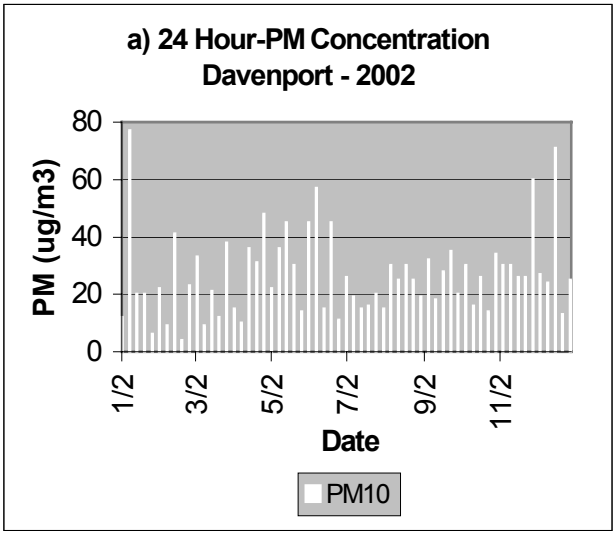
Table F-3. Monitoring Site Level Designation Values* for the State PM10 and PM2.5 Standards (2001-2003 Period).

Site	PM10 (ug/m^3)		PM2.5 (ug/m^3)
	24-Hour (Std.=50)	Annual Average (Std.=20)	Annual Average (Std.=12)
Carmel Valley	35	15	No monitor
Moss Landing	90	32	No monitor
Salinas	67	20	9
King City	Incomplete data	Incomplete data	No monitor
Hollister	59	18	No monitor
Davenport	81	29	No monitor
Santa Cruz	42	19	9
Watsonville	49	19	No monitor

* Designation value is the value used for determining attainment status. It is the highest measured value over three years after excluding highly irregular or infrequent events.

Figure F-2 illustrates the variation in PM10 levels throughout 2002 at Davenport (a) and Moss Landing (b). Figure F-3 shows the variation in PM10 and PM2.5 during 2002 at Salinas, while Figure F-4 illustrates the variation in PM2.5 levels during the same year at Santa Cruz. The total height of the bars represents PM10 concentrations, while the height of the black portion of the bars represents the PM2.5 fraction. At Davenport and Moss Landing, peak PM10 concentrations occurred during the spring through early summer and in the winter. At Salinas, the coarse fraction (particles between PM2.5 and PM10 in size) was largest during the spring through early fall. The coarse fraction is primarily due to activities that resuspend dust, such as emissions from paved and unpaved roads and construction. At some coastal sites, sea salt may also contribute to the coarse fraction.

Figure F-2. Seasonal Variation in PM10 Concentrations



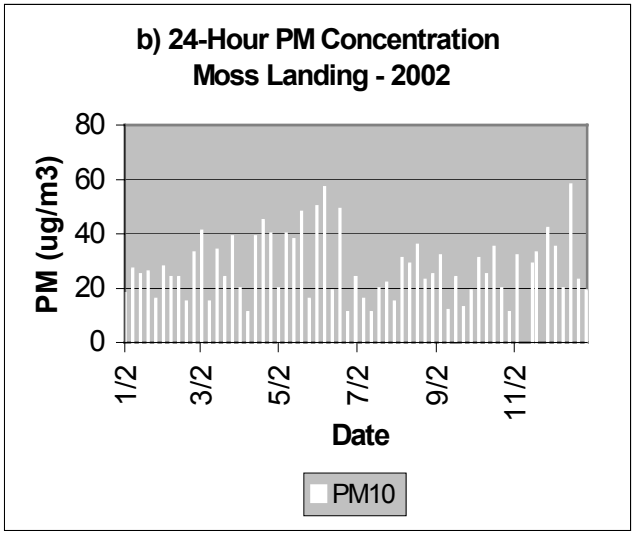


Figure F-3. Seasonal Variation in PM10 and PM2.5 Concentrations.

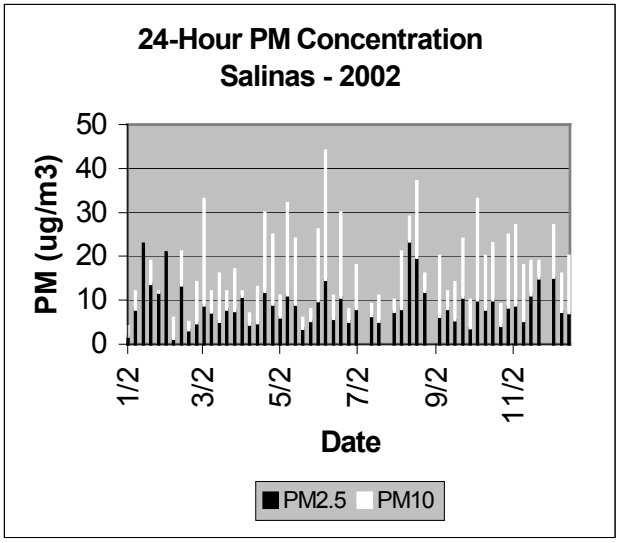
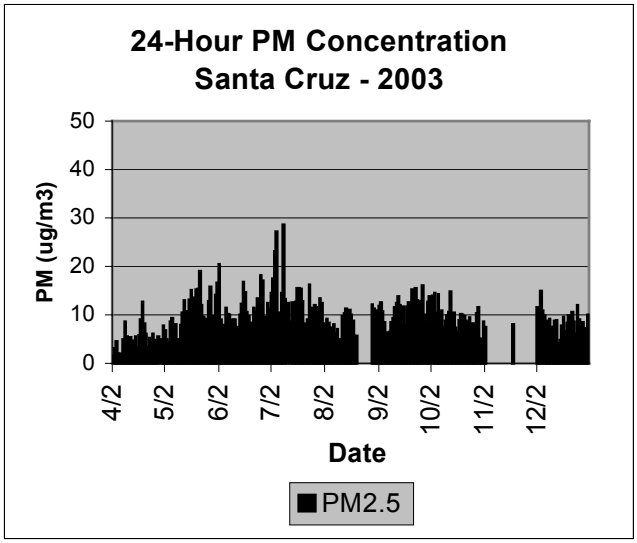


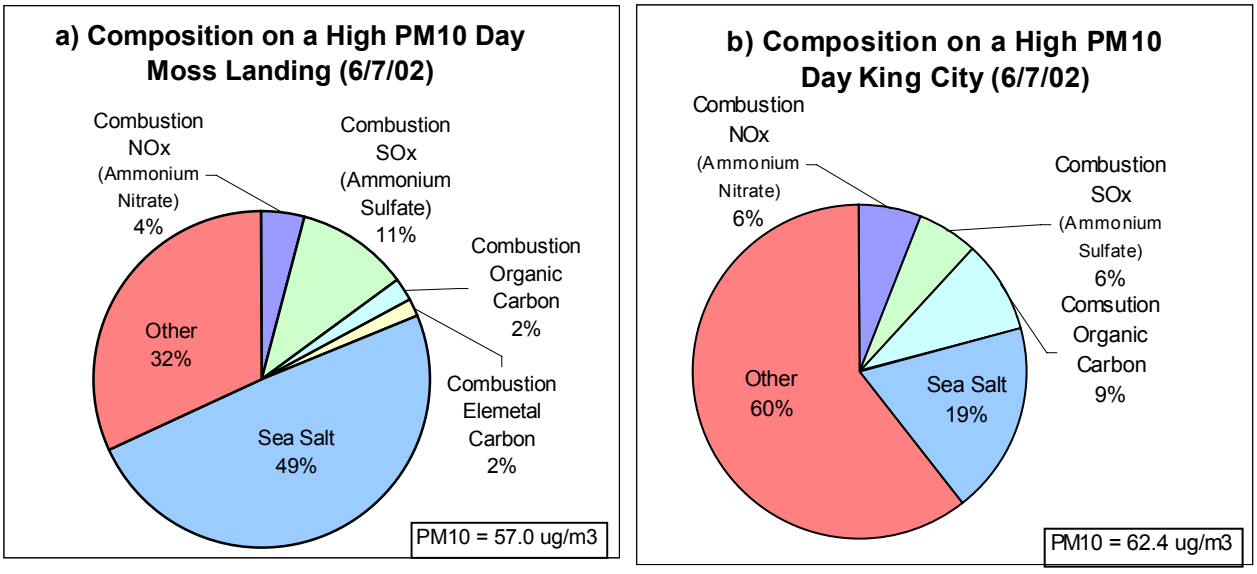
Figure F-4. Seasonal Variation in PM2.5 Concentrations.



In contrast, the highest PM2.5 concentrations occurred during the late fall and winter. The colder, more stagnant conditions during this time of the year are conducive to the buildup of PM2.5, including the formation of secondary ammonium nitrate. In addition, increased activity from residential wood combustion may also occur. High PM2.5 concentrations also occurred in August at Salinas and in July at Santa Cruz. Sunnier, warmer conditions during the summer are conducive to the formation of secondary ammonium sulfate particles, and may increase secondary organic aerosol formation as well. On an annual average, based on 2000-2003 monitoring data, we estimate that PM2.5 comprises approximately 45 percent of the PM10 ambient levels.

Data for Figure F-5 are from analysis of ambient PM10 data collected at the coastal site of Moss Landing (a) and the inland site of King City (b) during a high PM10 concentration day. Chemical components have been associated with possible emission sources based on emission inventory information. The data show the principal source of PM10 at Moss Landing is sea salt, followed by "other", which in this case consists of dust from roads and other dust producing activities, plus other unidentified sources. In contrast, "other" is the major component at King City, followed by sea salt.

Figure F-5. PM10 Chemical Composition on a High Concentration Day and Link to emission Source Type.



Ammonium sulfate formed through reactions in the atmosphere of SOx emitted from mobile and stationary combustion sources is the third main component at Moss Landing, but is less prevalent at King City. Additional PM components at Moss Landing include ammonium nitrate formed through chemical reactions in the atmosphere of NOx from vehicle exhaust and stationary combustion sources; organic carbon, and elemental carbon from combustion sources.

The majority of organic carbon is suspected to be due to directly emitted carbon from combustion sources. Key sources include vehicles, residential wood combustion, agricultural and prescribed burning, and other stationary combustion sources. However, a fraction may be due to secondary organic aerosol formation from anthropogenic and biogenic VOC emissions. At King City, the level of the organic carbon component is higher than at Moss Landing. Based on these composition data and on the previously mentioned estimate that on an annual average basis, PM2.5 contributes approximately 45 percent to ambient PM10, we estimate that secondary ammonium nitrate and ammonium sulfate comprise approximately 35 percent of PM2.5.